

Amendments to the Claims:

1. (Currently amended) An integrated fan pump comprising:
 - a housing for supporting the integrated fan pump, wherein the housing has a rectilinear configuration;
 - a fan coupled to the housing and having a fan head;
 - a fan propeller coupled to the fan head, wherein the fan propeller is selected from the group consisting of axial, tubeaxial, centrifugal, crossflow, backward-curved, forward-curved, airfoil, turbine, and straight radial;
 - a pump adapted to transfer a coolant from a coolant inlet to a coolant outlet, an external geometry of ~~said~~the pump adapted to be sufficiently compact such that gas flow through ~~said~~the fan and around the~~said~~ pump is substantially unimpeded by ~~said~~the pump, ~~said~~the gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet, the pump having a pump head;
 - a pump impeller coupled to the pump head, wherein the pump impeller is selected from the group consisting of axial propeller blade, straight radial blade, centrifugal blade, backward-curved blade, forward-curved blade, and turbine blade;
 - a phase change device coupled to the pump;
 - an axle having a first axle segment coupled to the fan head and a second axle segment coupled to the pump head;
 - a mechanical gear coupled to the first axle segment and the second axle segment, wherein the mechanical gear is configured to rotate the first axle segment at a different rate than the second axle segment;
 - an expansion tank coupled to the pump;
 - a gas-release valve coupled to the expansion tank;

a liquid seal formed between the fan head and the pump head proximate to the axle, the liquid seal including a material selected from the group consisting of nitrile, polyacrylate, ethylene propylene, chloroprene, fluoro, silicone and butyl rubbers;

a heat source connected to the coolant outlet of the pump;

a heat exchanger coupled to the expansion tank, wherein the heat exchanger includes a plurality of disc-shaped fins and is coupled to the heat source, the heat exchanger using heat conduction and forced convection to transfer heat from the heat source to the coolant, and the heat exchanger is directly mounted to a surface of the fan; and

an electrical drive mechanism, wherein the electrical drive mechanism is a DC brushless motor and includes:

a first magnet coupled to the pump, the first magnet having a disc shape;

a second magnet coupled to the fan, the second magnet having a disc shape, wherein the first magnet and the second magnet are substantially collinear; and

a magnetic coil disposed between the first magnet and the second magnet, the magnetic coil having two solenoids, wherein the ~~an~~ electrical drive mechanism is configured to simultaneously drive ~~said~~the fan and ~~said~~the pump, wherein ~~said~~the electrical drive mechanism has a rotational rate in the range of 2000 to 3000 rpm and ~~said~~the pump has a pump flow rate in the range of ~~of~~ 5 cc/sec to 10 cc/sec and rotates the fan and the pump with respect to the housing.

2-10. (Cancelled)

11. (Currently amended) An integrated fan pump comprising:
a housing for supporting the integrated fan pump;
a fan coupled to the housing and having a fan head;
a fan propeller coupled to the fan head, wherein the fan
propeller is selected from the group consisting of axial,
tubeaxial, centrifugal, crossflow, backward-curved, forward-
curved, airfoil, turbine, and straight radial;
a pump adapted to transfer a coolant from a coolant inlet
to a coolant outlet, an external geometry of the pump adapted to
be sufficiently compact such that gas flow through the fan and
around the pump is substantially unimpeded by the pump, the gas
flow moving from a gas flow inlet in a substantially straight,
unchanged direction to a gas flow outlet, the pump including a
pump head;
a pump impeller coupled to the pump head, wherein the pump
impeller is selected from the group consisting of axial
propeller blade, straight radial blade, centrifugal blade,
backward-curved blade, forward-curved blade and turbine blade;
a phase change device coupled to the pump;
an expansion tank coupled to the pump;
a gas-release valve coupled to the expansion tank;
an axle that is fixed to the housing and includes a first
axle segment and a second axle segment;
a mechanical coupling connected to the first axle segment
and the second axle segment;
a liquid seal formed between the fan head and the pump head
proximate to the axle, the liquid seal including a material

selected from the group consisting of nitrile, polyacrylate, ethylene propylene, chloroprene, fluoro, silicone and butyl rubbers;

a heat source connected to the coolant outlet of the pump;

a heat exchanger coupled to the expansion tank, wherein the heat exchanger includes a plurality of disc-shaped fins and is coupled to the heat source, the heat exchanger using heat conduction and forced convection to transfer heat from the heat source to the coolant, and the heat exchanger is directly mounted to a surface of the fan; and

an electrical drive mechanism configured to simultaneously drive the fan and the pump, wherein the electrical drive mechanism has a rotational rate in the range of 2000 to 3000 rpm and the pump has a pump flow rate in the range of 5 cc/sec to 10 cc/sec and includes an electric motor configured to rotate the fan and the pump with respect to the housing and about the~~The apparatus of claim 5, wherein: said fan includes a fan head coupled to a fan propeller; said pump includes a pump head coupled to a pump impeller; and said fan head and said pump head are configured to rotate about a common axle that is fixed to said~~the housing.

12. (Currently amended) The apparatus of claim 11, wherein ~~said~~the electric motor comprises a magnetic coil fixed to ~~said~~the housing, a first magnet fixed to ~~said~~the fan head, and a second magnet fixed to ~~said~~the pump head.

13. (Currently amended) The apparatus of claim ~~11~~12, wherein ~~said~~the first magnet and ~~said~~the second magnet are substantially

coaxial toroidal magnets having ~~said~~the magnetic coil fixed therebetween.

14. (Currently amended) The apparatus of claim ~~13~~12, wherein ~~said~~the first magnet and ~~said~~the second magnet are substantially disc-shaped magnets having ~~said~~the magnetic coil fixed therebetween.

15-17. (Cancelled)

18. (Currently amended) The apparatus of claim 511, wherein ~~said~~the electric motor is a DC brushless motor.

19. (Currently amended) The apparatus of claim 511, wherein ~~said~~the electric motor is a DC brush type motor.

20. (Currently amended) The apparatus of claim 511, wherein ~~said~~the electric motor is an AC motor.

21-23. (Cancelled)

24. (Currently amended) A method of manufacturing an integrated fan pump, comprising:

providing a housing for supporting the integrated fan pump;

providing an axle coupled to the housing;

providing a fan coupled to the housing, wherein the fan includes a fan head and a fan propeller;

providing a pump adapted to transfer a coolant from a coolant inlet to a coolant outlet, ~~said~~the pump positioned

entirely outside a gas flow region of the fan such that gas flow through ~~said~~the fan and around the~~said~~ pump is substantially unimpeded by ~~said~~the pump, ~~said~~the gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet, wherein the pump includes a pump head and a pump impeller, and the fan head and the pump head are attached to the axle, the fan, pump and axle rotating together with respect to the housing;~~and~~

providing an expansion tank coupled to the pump;

providing a gas-release valve coupled to the expansion tank;

providing a liquid seal formed between the fan head and the pump head proximate to the axle, the liquid seal including a material selected from the group consisting of nitrile, polyacrylate, ethylene propylene, chloroprene, fluoro, silicone and butyl rubbers;

providing a heat exchanger coupled to the expansion tank, and wherein the expansion tank is coupled to the coolant inlet of the pump, and the coolant outlet of the pump is coupled to the heat source to provide cooling thereof;

providing a heat source coupled to the heat exchanger; and

providing an electrical drive mechanism configured to simultaneously drive ~~said~~the fan and ~~said~~the pump.

25-26. (Cancelled)

27. (Currently amended) The method of manufacture of claim 24, wherein ~~said~~the electrical drive mechanism comprises an electric motor configured to rotate ~~said~~the fan and ~~said~~the pump with

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Der Jeou Chou et al.

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respect to ~~a~~the housing.

28-31. (Cancelled)

32. (Currently amended) The method of manufacture of claim
24~~5~~, wherein ~~said~~the heat exchanger is directly mounted to a
surface of ~~said~~the fan.

33. (Cancelled)